भारतीय मानक

Indian Standard

IS 18102 : 2023

किण्वित मछली — शीदल या नगारी — विशिष्टि

Fermented Fish — Sheedal or Ngari — Specification

ICS 67.120.30

© BIS 2023

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

March 2023 **Price Group 7**

Fish, Fisheries and Aquaculture Sectional Committee, FAD 12

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Fish, Fisheries and Aquaculture Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Sheedal is a salt-free fermented fish product indigenous to the Northeast sector of India. *Sheedal* is very popular due to its strong flavor, and the product is usually prepared from salt-free dried *Puntius* sp. or *Setipinna phasa.* It has several local names, and is popularly called "*seedal*", "*sepaa*", "*hidal*", "*verma*", and "*sheedal*" in Tripura, Assam, Mizoram, Arunachal Pradesh and Nagaland. In particular, Assam and Tripura are the major producers of *Sheedal* amongst the Northeast states of India. In Manipur, *Sheedal* is named as *Ngari* and both are produced in the same manner. According to the Tripura's indigenous Kokborok dialect, it is called Berma. Presently, the production of *Sheedal* is confined to particular districts of the states of Assam (Nagaon, Dhubri, Goal para, and Kachar districts), Manipur (Imphal city), and Tripura (West Tripura district). *Sheedal* is usually produced in the months of November–February. The technology of *Sheedal* production is very old and is believed to have come into existence at least before the British Era in the Northeastern states of India.

There is a huge demand for *Sheedal* in all the rural and urban markets of the northeast India and product of sub-standard quality are coming to markets. Presently different qualities of *Sheedal/Ngari* are available in the market and as there is no standard specification exists, it is difficult to control the quality. The main causes for poor quality product are; utilization of unsold dry fish for *Sheedal* production and early fermentation; use of insect infested/old raw material (i.e., dried *Puntius* spp. and *S. phasa*); mixing of old, insect infested and cheap varieties of dried marine fish (cutting as the size of *Puntius* fish) along with dried *Puntius* spp. and *S. phasa*; use of colouring material during fermentation; use of vegetable oil during fermentation etc.

The lower acidic *p*H of *Sheedal* usually does not allow growth of pathogenic bacteria, but the *Sheedal* available in the markets are mostly of *p*H more than 7.0 and these may be contaminated with pathogenic bacteria.

Gradually *Sheedal* is gaining popularity outside the northeast India and has potential to be exported to the Southeast Asian countries in properly packaged condition. Hygienic production and defined quality parameters of the fermented fish like *Sheedal/Ngari* with assured safety is essentially required for promotion of the product in unexplored markets.

The composition of the committee responsible for formulation of the standard is listed in Annex F and considerable assistance has been given by College of Fisheries, Tripura, a constituent college of Central Agricultural University, Imphal.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FERMENTED FISH — *SHEEDAL* OR *NGARI* — SPECIFICATION

1 SCOPE

1.1 This Standard prescribes the requirements and methods of sampling and test for *Sheedal*/*Ngari* produced by means of fermentation of small variety of fish.

1.2 *Sheedal*/*Ngari* shall be prepared from the following species:

a) *Puntius* spp; and
b) *Setipinna phasa.*

2 REFERENCES

The Indian Standard listed below contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

IS No.	*Title*
IS 594 : 1981	Specification for common salt for fish curing (*second revision*)
IS 1699 : 1995	Methods of sampling and test for food colours (*second revision*)
IS 4303 (Part 1) : 1975	Code of hygienic conditions for fish industry: Part 1 Pre-processing stage (*first revision*)
IS 5887 (Part 3) Sec 1 : 2020 /ISO 6579-1 : 2017	Methods for detection of bacteria responsible for food poisoning: Part 3 Horizontal method for the detection, enumeration and serotyping of *Salmonella,* Section 1 Detection of *Salmonella* spp. (*third revision*)
IS (Part 4) : 1999	Part 4 Isolation and identification of *Clostridium perfringens* (*Clostridium welchii*) and *Clostridium botulinum* and enumeration of *Clostridium perfringens* (*second revision*)
IS (Part 8) Sec 1 : 2002 / ISO 6888-1 : 1999	Part 8 Horizontal method for enumeration of coagulase — Positive staphylococci (*Staphylococcus aureus* and other species), Section 1 Technique using Baird — Parker agar medium
IS 10500 : 2012	Drinking water — Specification (*second revision*)
IS 10910 : 1984	Specification for polypropylene and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
IS 11427 : 2001	Fish and fishery products — Sampling (*first revision*)
IS 14764 : 2000	Polyethylene terephthalate (PET) containers for packaging of *vanaspati* — Specification
IS 16067 (Part 1) : 2020 / ISO 16649-1 : 2018	Microbiology of the Food Chain — Horizontal Method for the Enumeration of Beta — Glucuronidase — Positive Escherichia coli: Part 1 Colony-count technique at 44 °C Using Membranes and 5-Bromo-4-Chloro-3-Indolyl Beta-D-Glucuronide (*first revision*)
IS 16069 (Part 2) : 2013/ ISO 21527-2 : 2008	Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds: Part 2 Colony count technique in products with water activity less than or equal to 0.95
ISO/TS 17919 : 2013	Microbiology of the food chain — Polymerase chain reaction (PCR) for the detection of food-borne pathogens — Detection of botulinum type A, B, E and F neurotoxin-producing clostridia

3 GRADES

Sheedal/*Ngari* shall be graded as per the following parameters:

Grade Designation	*Count (No. per kg)*	
	Sheedal (*Ngari*) from *Puntius* species	*Sheedal* (*Ngari*) from *Setipinna phasa*
Large	Below 140	Below 130
Medium	200-250	150-200
Small	360 and more	290 and more

4 PROCESS

4.1 *Sheedal*/*Ngari* shall be prepared and processed as given in Annex A, under hygienic conditions as prescribed in IS 4303 (Part 1).

5 REQUIREMENTS

5.1 Raw Material

5.1.1 *Fish*

Sheedal shall be prepared from adequately dried, sound and wholesome fish, namely, *Puntius* spp. or *Setipinna phasa*, fit to be sold fresh for human consumption. Dried fish should not have any sign of insect or maggot infestation and broken parts as well as other physical hazards like sand, stones, dirt etc.

5.1.2 *Fermenting Container*

Fermentation takes place in earthen pear shaped container, made from very fine black soil. Such fermenting containers are oil processed (by smearing edible oil on both inside and outside, followed by sun drying till it does not absorb any more oil) before use.

5.1.3 *Water*

Water used for washing and soaking of dried fish shall be of potable quality (*see* IS 10500).

5.2 Other Ingredients

One or more of the following ingredients which are of food grade quality may be used depending on type of presentation: edible oil, common salt (*see* IS 594).

5.3 Food Additives

The material shall be free from artificial colouring matter and firming agents except common salt. Food additives for fish and fisheries products permitted under *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulations,* 2011,may be used.

5.4 Organoleptic Criteria

Organoleptically *Sheedal* shall be acceptable in terms of appearance and odour. Appearance of *Sheedal* shall be dull white to little brownish in colour, slightly glossy and sticky with no or very little distortion especially in the belly and caudal region. The product shall have odour characteristic of the product. The *p*H of the product shall be less than 6.0.

5.5 The product shall be free from any foreign matter.

5.6 The product shall conform to the requirements given in Table 1 and Table 2.

Table 1 Requirements for *Sheedal/Ngari*
(*Clause* 5.6)

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of Test, Ref to (4)
i)	Moisture, percent by mass	32-36	Annex B
ii)	Crude Protein (N × 6.25), percent by mass, *Min* (on	30	Annex C
iii)	wet weight basis)		
iv)	Sodium Chloride, percent by mass, *Max*	0.5	Annex D
v)	Lead, mg/Kg, *Max*.	0.3	AOAC 2015.01
vi)	Cadmium, mg/Kg, *Max*	0.3	AOAC 2015.01
vii)	Arsenic, mg/Kg, *Max*	76	AOAC 2015.01
viii)	Mercury, mg/Kg, *Max*	0.5	AOAC 2015.01
ix)	Chromium, mg/Kg, *Max*	12	15 of IS 1699

Table 2 Microbiological Requirements for *Sheedal/Ngari*
(*Clause* 5.6)

Sl No.	Characteristic	Requirement				Method of Test, Ref to IS or ISO
		Sampling Plan [1)]		Limit (cfu/g)		
		n	c	m	M	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Yeast and mould count	5	0	100		IS 16069 (Part 2)
ii)	Coagulase positive *Staphylococci*	5	1	1 x 10^2	1 x 10^3	IS 5887 (Part 8/ Section 1)
iii)	*Escherichia coli*	5	2	4	40	16067 (Part 1)
iv)	*Salmonella*	10	0	Absent/25g		IS 5887 (Part 3/Section 1)
v)	*Clostridium botulinum*	Sampling plan to be defined		Absence of viable spores or vegetative cells of *Clostridium botulinum* and absence of botulinum toxin		IS 5887 (Part 4) and ISO/TS 17919

[1)] For sampling plan see Annex E.

6 PACKING

Sheedal/Ngari shall be packed in Poly Propylene containers (*see* IS 10910) with or without vacuum or glass/food grade polyethylene terephthalate jar (*see* IS 14764) immediately after taking out from the fermenting container under hygienic conditions.

7 MARKING

7.1 Each package (pouch/jar) of *Sheedal/Ngari* shall be marked or labelled with the following particulars:

a) Name of the material;
b) Grade;
c) Name and address of the processor;
d) Batch or code number;
e) Net mass;
f) List of ingredients in descending order;
g) Date of packing;
h) Date of expiry or use by date; and
j) Any other markings required under the *Legal Metrology (Packaged Commodities) Rules, 2011*, and *the Food Safety and Standards (Packaging and Labelling) Regulations,* 2011.

7.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

8 SAMPLING

8.1 The method of drawing representative samples of the material for test and the criteria for conformity shall be according to the method prescribed in IS 11427.

ANNEX A
(*Item* 4.1)

DESCRIPTION, PREPARATION AND PROCESSING OF *SHEEDAL* (*NGARI*)

A-1 DESCRIPTION

Sheedal/*Ngari* is a salt-free fermented fish product, prepared from dried and partially water soaked *Puntius* spp. and *Setipinna phasa* in airtight earthen container in partially anaerobic condition, without addition of any other ingredients. Generally, the fermentation process takes 3-5 months. The appearance of the product is solid, bilaterally compressed and partially sticky and shape of the fish remains almost unchanged except little disintegration near belly and caudal portion. The colour of the best quality product is dull white that gradually becomes slight brownish to deep brownish on continuous exposure to air. The strong odour permeates the air in and around the storage and gives the area a characteristic smell of *Sheedal*. The product is intended for consumption after cooking with or without oil and also by grilling.

A-2 FERMENTATION TECHNIQUE

A-2.1 Preprocessing of Fish

Fish intended for use must be re-dried under hygienic condition under sunlight for 2-3 days. Dried fish must be cleaned and screened to remove broken and insect infested fish. Before 12 hours of stuffing, Dried and cleaned fish must be simultaneously washed and soaked in running water for cleaning and water absorption 12 hours before stuffing in fermenting containers. Washed and water soaked fish must be dried overnight under shed for partial drying.

A-2.2 Stuffing Partially Dried Fish in Fermenting Container

Processing area for stuffing fish in the fermenting container must be clean, under shed and hygienic. Partially dried fish must be stuffed as compact as possible avoiding any void spaces in the container, up to the neck portion. Primary sealing of the stuffed container must be done with semi-solid paste made from the broken parts of raw material fish with height of 2 inch -2.5 inch, and covered by dry leaves (preferably dry banana leaf). Final sealing of the stuffed containers must be done with semi-solid clay soil, free from debris, insects etc. The clay layer is checked on and often for about 7 days, for any crack and is repaired immediately by wet mud again, and finally covered with thin polythene sheet. The sealed fermenting containers are kept in the fermentation shed and left undisturbed. The fermentation shed must be well ventilated for easy movement of air throughout, lightly roofed and fenced, hygienic and well sanitized. Entry of rodents, dogs, cats, birds etc. in the fermentation shed must be avoided. Persons involved in stuffing operation should not have any scours/lesions in body especially in hands or legs. Spitting, smoking, chewing tobacco etc. are not allowed in fish stuffing area.

A-3 DURATION OF FERMENTATION

Fermentation shall be adequate till transformation of dried raw fish to *Sheedal/Ngari*. The usual fermentation period is 3-5 months.

A-4 MARKETING OF *SHEEDAL/NGARI*

Retail marketing should be done by taking out product from the fermenting container. Deterioration of the product is very quick when exposed to the atmosphere. It is advisable to package the product with or without vacuum immediately after proper fermentation, to enhance shelf-life of the product.

ANNEX B

[*Table* 1, *Item* (i)]

DETERMINATION OF MOISTURE

B-1 PROCEDURE

B-1.1 Weigh accurately about 5 g of the material in an aluminium dish having a diameter of at least 50 mm and a depth not exceeding 40 mm, previously dried in an oven and weighed. Shake the dish until the contents are evenly distributed. With the cover removed, place the dish to dry in an air-oven maintained at (100 ± 2) °C. Cool in a desiccator and weigh. Repeat the process of heating, cooling and weighing until the difference in mass between two successive weighings is less than one milligram. Record the lowest mass.

B-2 CALCULATION

B-2.1 Moisture, percent by mass $= \frac{100\,(M_1 - M_2)}{M_1 - M}$

where

M_1 = mass, in g, of the dish with the material before drying;
M_2 = mass, in g, of the dish with the material after drying; and
M = mass, in g, of the empty dish.

ANNEX C

[*Table* 1, *Item* (ii)]

DETERMINATION OF CRUDE PROTEIN

C-1 METHOD

C-1.1 The percentage of crude protein is ascertained by multiplying the percentage of nitrogen other than ammoniacal nitrogen by 6.25. The quantity of ammoniacal nitrogen (*see* **C-5.2**) is separately determined and deducted from the total nitrogen (*see* **C-5.1**).

C-2 APPARATUS

C-2.1 Kjeldahl Flask — 500 ml capacity.

C-2.2 Distillation Assembly

The assembly consists of a round bottom flask of 1 000 ml rapacity fitted with a rubber stopper through which passes one end of the connecting bulb tube. The other end of the bulb tube is connected to a condenser which is attached by means of a rubber tube to a dip tube which dips into a known quantity of standard sulphuric acid contained in a conical flask of 500 ml capacity to which 3 to 4 drops of methyl red indicator solution have been added.

C-3 REAGENTS

C-3.1 Potassium Sulphate or Anhydrous Sodium Sulphate

C-3.2 Copper Sulphate

C-3.3 Concentrated Sulphuric Acid

Specific Gravity 1.84 (*see* IS 266).

C-3.4 Sodium Hydroxide Solution

Dissolve about 450 g of sodium hydroxide in 1 000 ml of water.

C-3.5 Standard Sulphuric Acid — 0.1 N

C-3.6 Standard Sodium Hydroxide Solution — 0.1 N

C-3.7 Methyl Red Indicator Solution

Dissolve 0.15 g of methyl red indicator in 500 ml of water (*see* IS 2263).

C-3.8 Magnesium Oxide (Carbonate Free) — Freshly Ignited

C-4 PROCEDURE

C-4.1 For Total Nitrogen

Transfer carefully about 0.2 g of the accurately weighed, oven dried material, to the Kjeldahl flask. Add about 10 g of potassium sulphate or anhydrous sodium sulphate, about 0.5 g of copper sulphate and 25 ml or more, if necessary, of concentrated sulphuric acid. Place the flask in an inclined position, and heat to the boiling point of the acid until frothing ceases. Increase heat until the acid boils vigorously and digest for about two hours after the mixture is clear. Cool the content of the flask. Transfer quantitatively to the round bottom flask, with water, the total quantity of water used being about 200 ml. Add a few pieces of pumice stone to prevent bumping. Add sufficient sodium hydroxide solution to make the solution alkaline, carefully down the side of the flask so that it does not mix at once with the acid solution but forms a layer below the acid layer. Assemble the apparatus taking care that the tip of the dip tube extends below the surface of the standard sulphuric acid (25 ml) in the receiver. Mix the contents of the flask by shaking and distil until all ammonia has passed over into the standard sulphuric acid. Titrate the excess of acid with the standard sodium hydroxide solution using methyl red indicator. Carry out a blank determination using all the reagents in the same quantities but without the material.

C-4.2 For Ammoniacal Nitrogen

Weigh accurately 2 g to 4 g of the dried material. Shake it well with water and filter. Wash the residue thoroughly with water. Transfer the filtrate to the distillation flask and dilute to about 200 ml with water. Add about 5 g of magnesium oxide. Connect the flask to the condenser by means of the connecting bulb tube and distil about 100ml of liquid into the receiver containing standard sulphuric acid and methyl red indicator solution. Titrate the contents of the receiver with the standard sodium hydroxide solution.

C-4.2.1 Carry out a blank determination using ail reagents in the same quantities but without the material.

C-5 CALCULATION

C-5.1 Total nitrogen, percent by mass = X = $\frac{1.4\,(V-v)N}{M}$

where

V = volume, in ml, of the standard sodium hydroxide solution used to neutralize the acid in blank determination **(C-4.1.1)**;
v = volume, in ml, of the standard sodium hydroxide solution used to neutralize the excess acid in the test with the material (**C- 4.1**);
N = normality of the standard sodium hydroxide solution; and
M = mass, in g, of the dried material taken for the test (**C- 4.1**).

C-5.2 Ammoniacal Nitrogen

Percent by mass of ammoniacal nitrogen, $\gamma = \frac{1.4\,(V-v)N}{M}$

where

V = volume, in ml, of the standard sodium hydroxide solution used to neutralize the acid in blank determination (**C-4.2.1**);
v = volume, in ml, of the standard sodium hydroxide solution used to neutralize the excess acid in the test with the material **(C- 4.2**);
N = normality of the standard sodium hydroxide solution; and
M = mass, in g, of the dried material taken for the test **(C- 4.2**).

C-5.3 Crude protein, on moisture-free basis, percent by mass = 6.25 ($X - \gamma$)

where

X = percent by mass of total nitrogen (**C-5.1**); and
γ = percent by mass of ammoniacal nitrogen **(C-5.2)**.

ANNEX D

[*Table* 1, *Item* (iii)]

DETERMINATION OF SODIUM CHLORIDE IN BRINE

D-1 REAGENTS

D-1.1 Standard Silver Nitrate Solution — 0.1 N

D-1.2 Dilute Nitric Acid

(1 : 4) freed from lower oxides of nitrogen by boiling till colourless.

D-1.3 Ferric Alum Indicator Solution

A saturated solution of ferric alum [$FeNH_4(SO_4)_2.12H_2O$].

D-1.4 Standard Ammonium Thiocyanate Solution 0.1 N

D-2 PROCEDURE

D-2.1 Preparation of Solution

Weigh the unopened containers that have been kept at ambient temperature for a minimum of 12 h prior to examination. After opening container, tilt the container so as to distribute the contents over the meshes of the circular sieve. Incline the sieve at an angle of approximately 17° to 20° and allow the product to drain two minutes, measured from the time the product is poured into the sieve. Collect the drained liquid for determination of sodium chloride in brine.

D-2.2 Take a suitable aliquot of the drained liquid solution prepared as in **D-2.1**, add a known volume of the standard silver nitrate solution in slight excess and then add 20 ml of dilute nitric acid. Boil gently on a hotplate or a sand-bath until all solids except silver chloride dissolve (usually 15 min). Cool, add 50 ml of water and 5 ml of the ferric shun indicator solution and titrate with the standard ammonium thiocyanate solution until permanent light brown colour appears.

D-3 CALCULATIONS

D-3.1 Sodium chloride in the brine, percent by weight $= \frac{5.85\ (V_1N_1 - V_2N_2)}{M}$

where

V_1 = volume in ml of the standard silver nitrate solution added;
N_1 = normality of the standard silver nitrate solution;
V_2 = volume in ml of the standard ammonium thiocyanate solution used;
N_2 = normality of the standard ammonium thiocyanate used; and
M = mass in g of the brine in the aliquot.

NOTE — The total mass of brine is obtained by finding the difference between the net mass and the drained mass of the contents of the can.

ANNEX E

(*Table* 2)

SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

E-1 Sampling Plan for microbiological requirements

The terms n, c, m and M used in this standard have the following meaning:

n = Number of units comprising a sample;

c = Maximum allowable number of units having microbiological counts above m;

m = Microbiological limit that may be exceeded number of units c; and

M = Microbiological limit that no sample unit may exceed.

ANNEX F
(*Foreword*)

COMMITTEE COMPOSITION

Fish, Fisheries and Aquaculture Sectional Committee, FAD 12

Organization	*Representative(s)*
Indian Council of Agricultural Research, New Delhi	Dr Joy Krushna Jena (***Chairperson***)
All India Shrimp Hatchery Association, Hyderabad	Shri D. Ramraj Shri K. Madhusudan Reddy (*Alternate*)
Central Agricultural University, Imphal	Dr R. K. Majumdar
Central Institute of Fisheries Education, Mumbai	Dr Gopal Krishna Dr B. B. Nayak (*Alternate*)
Coastal Aquaculture Authority, Chennai	Shri Antony A. Xavier
Defence Food Research Laboratory, Mysore	Director
Export Inspection Council of India, New Delhi	Shri R. M. Mandalik
Food Safety and Standards Authority of India, NewDelhi	Dr A. K. Mishra Ms Anju Kavi (*Alternate*)
ICAR - Central Inland Fisheries Research Institute, Kolkata	Dr Dharmendra Kumar Meena Dr Bijay Kumar Behera (*Alternate*)
ICAR-Central Institute for Fisheries Technology, Kochi	Dr Satyen Kumar Panda Dr C. O. Mohan (*Alternate* I) Dr T. V. Sankar (*Alternate* II)
ICAR-Central Institute of Brackish Water Aquaculture, Chennai	Dr K. Ambasankar Dr Subhendu Kumar Otta (*Alternate* I) Dr P. K. Patil (*Alternate* II)
ICAR-Central Institute of Fresh Water Aquaculture, Bhubaneswar	Dr P. C. Das Dr Kedar Nath Mohanta (*Alternate*)
Marine Products Export Development Authority, Kochi	Dr Ram Mohan M. K. Shri V. Vinod (*Alternate*)
National Fisheries Development Board, Hyderabad	Director
National Institute of Fisheries Post Harvest Technology and Training, Ernakulam	Dr Jai Singh Meena Shri Varghese John (*Alternate*)
Seafood Exporters Association of India, Kochi	Shri Norbert Karikkassery
Society of Aquaculture Professional, Chennai	Shri Ravikumar Yellanki Shri P. K. Senthil Kumar (*Alternate*)
BIS Directorate General	Shrimati. Suneeti Toteja, Scientist 'E'/ Director and Head (Food And Agriculture) [Representing Director General (*Ex-officio*)]

Member Secretary
Shrimati Navita Yadav
Scientist 'D'/Joint Director
(Food And Agriculture), BIS

This Page has been Intentionally left blank

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.

This Indian Standard has been developed from Doc No.:FAD 12 (18363).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi